Gold King Mine Spill Response Recommendation for Removal of Orange Sediment from "Eddy Pool Area" on the Animas River Adjacent to (b) (6) Property

(b) (6), Durango, Colorado 81301

Background: On Saturday, 15 August 2015, Ms. Joni Sandoval (EPA OSC) and Mr. Art Slayton (Environmental Restoration, LLC [ER]) performed a site visit at (b) (6) property located at (b) (6), Durango, Colorado 81301. During the site visit, (b) (6) expressed concern about his property along the Animas River where orange sediment had collected in an "eddy," potentially affecting a prime fishing hole for recreation. (b) (6) asked the EPA to restore the eddy to previous conditions.

Site Visit: On Thursday, 27 August 2015, Mr. Eric DeRuyter, P.E. (Weston, Solutions, Inc. [Weston]), Mr. Mike Link (Weston), Mr. Art Slayton (ER), and Ms. Christine Wagner (EPA OSC) met with (b) (6) at his property to discuss and evaluate the possibility of using heavy equipment to access the "eddy area" and flush out the orange sediment.

The "eddy area" is a location along the eastern embankment of the river where tree stumps and river debris have collected, creating an area where the current low-level of water in the river does not flow through, thereby creating an eddy in the water. Without flow, the orange sediment in the eddy area has not been flushed naturally down the river (see **Photographs 1 and 2**). Ms. Wagner explained that artificial flushing is an acceptable means to remove the orange sediment and involves the use of a water truck with a pump and fire hose to spray (i.e., flush) the orange sediment from the area.

The main concern is maintaining the integrity of the soil embankment while safely accessing the peninsula to make excavation "cuts" in the peninsula. These cuts will allow water to flow through the eddy area as the sides of the eddy area are being sprayed to flush out the orange sediment downstream (see **Photograph 1**). The current eddy area is acting as a buffer and protects the embankment from erosion. The eddy area is essentially a dead zone that keeps the existing river current away from the embankment. It is agreed that after the eddy area is flushed, the cuts made in the peninsula to open the flow will be backfilled to again stop the flow (i.e., returned to its original state).

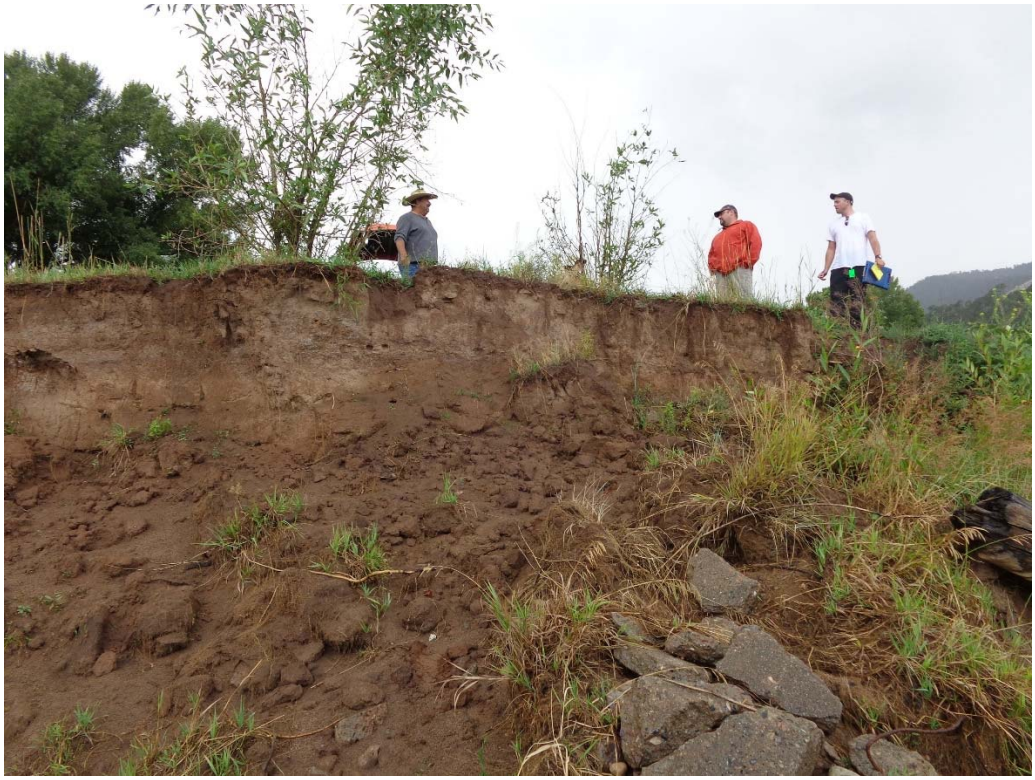
(b) (6) commented that the level of flow in the river is at historic lows right now and will be much higher in the upcoming rainy season. Higher water levels are evident by the large tree and sediment that make up the peninsula (see **Photograph 1**), which likely were once part of the adjacent embankment itself. When high water events occur, the eddy area is overtopped with flow that cuts away at the embankment, resulting in sloughing of soil and trees located at the edge of the embankment.

It was explained to (b) (6) that any cuts EPA makes in the peninsula to create flow-through will be backfilled up to existing conditions (i.e., current elevation) and, therefore, future high-flow events would still overtop the existing eddy area and continue to erode the embankment (see **Photographs 3 and 4**).

Photograph 1: Looking upriver at the eddy area created by the peninsula of a dead tree and sediment. Notice that the orange sediment is limited to the upriver side of the peninsula because water does not flow through to the pool of water in the foreground.

Photograph 2: Eddy area with orange sediment. Looking downriver.

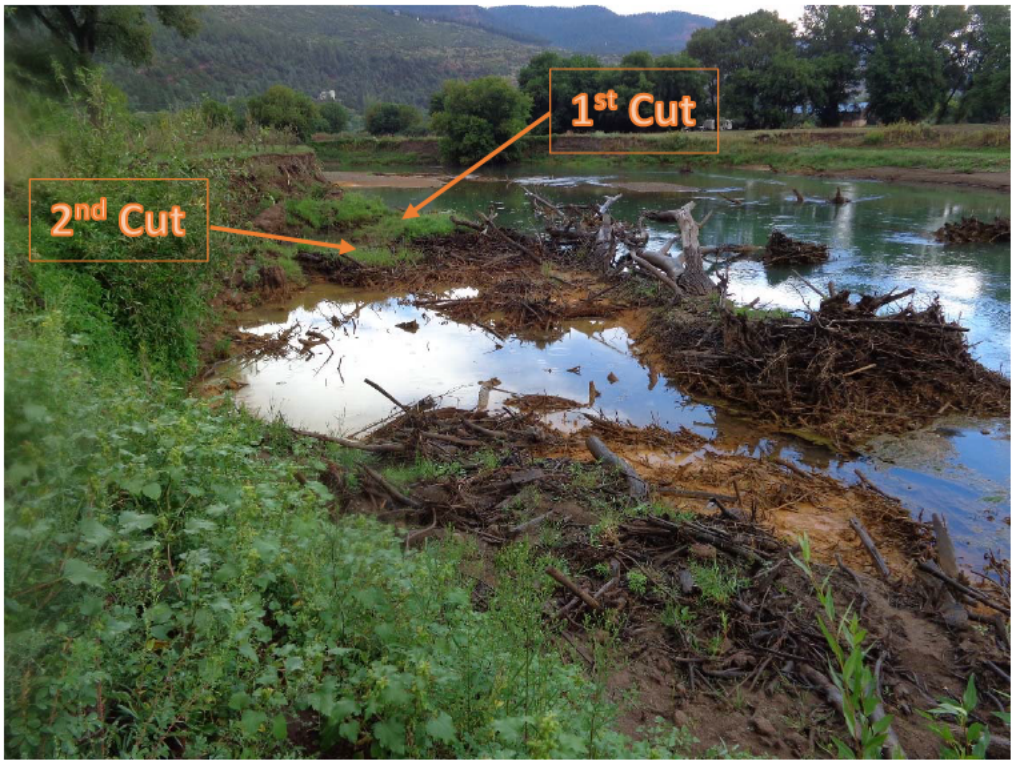
Photograph 3: Embankment (approximately 8 to 10 feet in height) located adjacent to the eddy area.



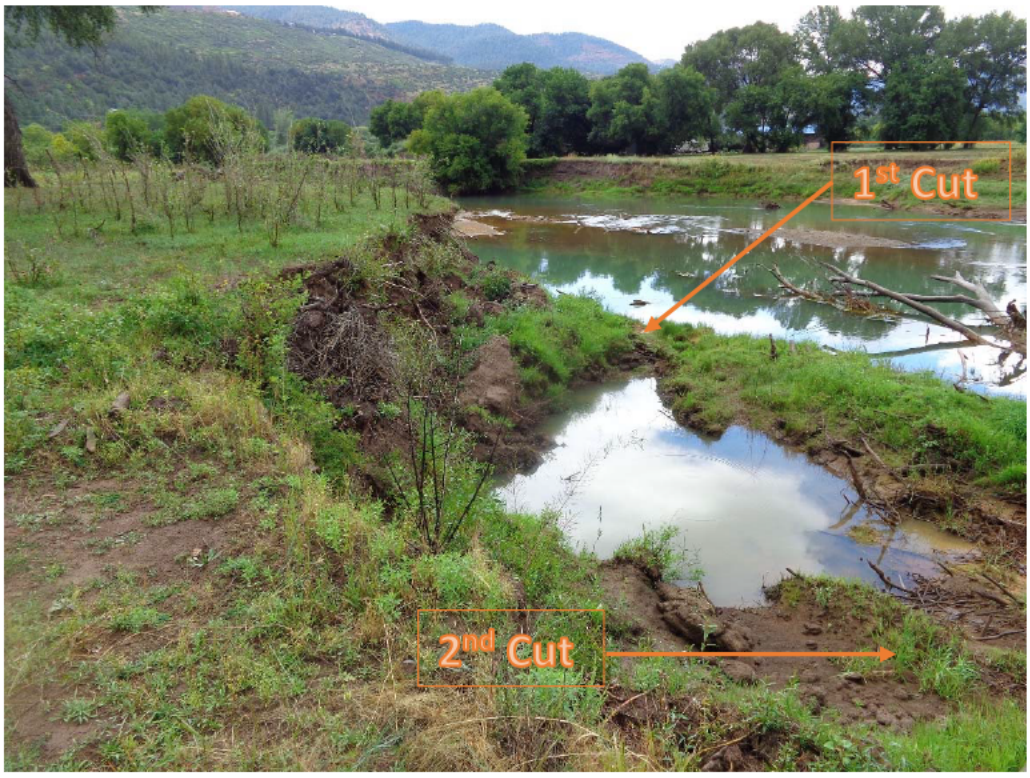
Photograph 4: Looking up the embankment from the shoreline of the Animas River adjacent to the eddy area. Notice that the current embankment has recently sloughed.

Recommendation: Although several alternatives exist for removing the orange sediment from the eddy area, including "no action" (allowing the next high-water event to overtop the current peninsula and thereby naturally flush out the eddy area), Weston believes the most timely and safe alternative would be to make cuts to the peninsula using an excavator positioned on top of the current embankment, instead of trying to position the excavator and personnel at the water shoreline. The following is a brief outline of steps that Weston recommends to flush out the orange sediment from the eddy area.

1. If there are any other locations upstream from (b) (6) property that also require artificial flushing, conduct flushing operations upstream first to avoid reoccurrence of the same issue.
2. Mobilize a track-mounted excavator (i.e., "track hoe") with a long-reach boom (60-foot "long stick" recommended) to the site along with the water truck/pump/fire hose. Low ground pressure (LGP) tracks for the track hoe are preferable to minimize ground pressure and thereby minimize sloughing of the embankment. As an alternative, timber mud mats (i.e., swamp mats) could be placed on top of the embankment and used as a working platform for the track hoe.
3. With the track hoe positioned on top of the embankment and as far back as possible from the shoulder of the embankment (with the operator still able to see the bottom of the eddy area), make two excavation cuts in the peninsula to create open-flow through the area (see **Photographs 5, 6, 7, and 8**). The main area of the peninsula with the dead tree will, in essence, become an island.
4. To avoid spreading the orange sediments to the "clean pool" sediments (located at the downstream side of the eddy area), the excavation cuts should be made from the downstream side of the peninsula with work progressing from downstream to upstream (see **Photographs 5, 6, 7, and 8**). In other words, the water in the eddy pool should be maintained as long as possible so that the last bucket of sediment removed from the 2nd cut finally releases the water.
5. Excavated sediment should be stockpiled, as directed by EPA, at a pre-established location, but far enough away from the shoulder of the embankment to avoid sloughing of the embankment.
6. Excavated material containing the orange sediment (especially from the upstream side of the first cut) should be either: (1) placed into the main flow of the river to "flush" the sediment naturally; or (2) stockpiled separately for analysis/disposal, as directed by EPA.
7. Once flow through the eddy area has been established, flush the area with pressurized water from the water truck and fire hose. Special care should be given when flushing the shoreline near the toe of the embankment to avoid sloughing of the embankment.
8. After the orange sediment has been sufficiently flushed from the eddy area and downstream past the two cut locations, backfill the two cut locations with stockpiled sediment up to existing conditions (i.e., current elevation). Backfilled material should be compacted with the track hoe bucket.
9. Additional fill material may be required if orange sediment from the first cut was placed into the main flow of the river, so a borrow source should be identified with material available for backfilling operations.
10. Demobilize equipment after confirming that the eddy area has been restored to existing conditions (i.e., no flow through the eddy area).
11. If needed, vegetate disturbed areas with seed mix, as directed by (b) (6)
12. Visit the site periodically to ensure vegetation has been re-established in the disturbed areas.
13. Provide point of contact information for (b) (6) to contact EPA if further needs arise.



Photograph 5: Looking down at the eddy area from the shoulder of the embankment.



Photograph 6: Location where two cuts are recommended to create open flow through the eddy area to allow artificial flushing of the orange sediment out of the eddy area and downriver.

Photograph 7: Location of recommended first cut. Looking downstream.

Photograph 8: Location of recommended second cut. Looking upstream.